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ABSTRACT

Recent research has shown that when subjects are asked to make a judgment or decision based on incomplete information, they may infer or impute a value for the missing information based on their perception of the relationship between the missing and the presented information. To examine how clients evaluate and choose between therapists on the basis of actual and/or inferred qualifications, 63 students were asked to rate the competence of hypothetical clinical psychologists on the basis of the clinicians' experience in treating college-age patients with severe depression resulting from loneliness, and their familiarity with recent developments in treatment. Some clinicans were described by both factors, experience and familiarity with recent developments. Others were described by only one of these factors. A scenario was developed whereby subjects would expect a negative relationship between factors. Analysis of the relationship between responses on single-factor trials and responses on two-factor trials showed that the majority of subjects used the inferred negative relationship between factors to respond to situations with missing information. Furthermore, those subjects who placed the greatest weight on the experience factor were most apt to infer experience from familiarity, and those subjects who placed greatest weight on the familiarity factor were most apt to infer familiarity from experience. (Author/JAC)

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INFERENCE PROCESSES IN JUDGING CLINICAL COMPETENCY

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Abstract

This study was designed to model a category of clinical judgments in which a crucial source of information is unavailable at the time of decision making. The specific research question is how do clients evaluate and choose between therapists on the basis of actual and/or inferred qualifications. Subjects were asked to rate the competence of hypothetical clinical psychologists on the basis of the clinicians' experience in treating college-age patients with severe depression resulting from loneliness, and their familiarity with recent developments in treatment. Some clinicians were described by both factors, experience and familiarity with recent developments. Others were described by only one of these factors. A scenario was developed whereby subjects would expect a negative relationship between factors. By analyzing the relationship between responses on single-factor trials and responses on two-factor trials, we were able to show that the majority of subjects used the inferred negative relationship between factors to respond to situations with missing information. Furthermore, those subjects who placed the greatest weight on the experience factor were most apt to infer experience from familiarity, and those subjects who placed greatest weight on the familiarity factor were most apt to infer familiarity from experience.

INFERENCE PROCESSES IN JUDGING CLINICAL COMPETENCY

Recent research has shown that when subjects are asked to make a judgment or decision based on incomplete information, they may infer or impute a value for the missing information based on their perception of the relationship between the missing and the presented information (Huber & McCann, 1982; Johnson, 1984; Levin, Johnson, & Faraone, 1984; Yamagishi & Hill, 1981). However, direct evidence that subjects process information in this way is relatively scarce. In most tasks the predictions of an information integration model which assumes that subjects infer the value of missing information are indistinguishable from the predictions of the traditional averaging model of information integration (Anderson, 1981; Levin et al., 1984).

Tasks in which subjects are apt to perceive a negative relationship between stimulus factors are the most useful for distinguishing between models. In such tasks a favorable level of one factor will be associated with an unfavorable level of another factor. The effect of having some information missing may then be to "neutralize" the impact of the presented information. This prediction contrasts with the usual predictions of an averaging model where variations in a given stimulus dimension should have the greatest effect when no other information is provided. For a sizeable proportion of subjects in Levin et al.'s (1984) study of consumer judgments, variations in ratings of product satisfaction

as a function of price were less when price information was presented alone than when price and quality information were both presented. Presumably these subjects associated favorable prices with unfavorable quality and unfavorable prices with favorable quality.

The inferring-missing-values effect in the Levin et al. (1984) study was greater when quality information was missing than when price information was missing. In addition, subjects in this study tended to place greater weight on quality than on price information when rating price-quality combinations. This suggests that the inferring-missing-values effect is directly related to the subjective weight or importance of the missing source of information. The present study tests this hypothesis and provides new evidence for the inferring-missing-values effect in a task involving judgments of clinical competency.

The task required judgments of clinical competency based on information about prior experience in treating patients and degree of familiarity with recent developments in treatment. A scenario was established for perceiving these two factors as negatively related. The task may be representative of a variety of judgments where a crucial source of information is unavailable at the time of decision making.

Method

Stimulus Design

Subjects were asked to rate each of a series of hypothetical

clinical psychologists in terms of their competency for treating the problem of severe depression, resulting from loneliness, in college students. The clinical psychologists were described by the factors "number of patients seen" and "familiarity with recent developments in treatment." The levels of each factor were specified as "much above average," "above average," "average," "below average," or "much below average."

Instead of forming all possible pairs of values of the two stimulus factors, a design representative of a possible negative relationship between factors was selected. None of the hypothetical clinical psychologists was described by two values that were both favorable or by two values that were both unfavorable. Rather, clinicians were described as average, above average, or much above average on one factor and much below average, below average, or average on the other factor. This results in two 3 x 3 factorial subdesigns, as illustrated in Figure 1. (Note that the stimulus pair "average number of patients"--"average familiarity" appears in each subdesign, resulting in a total of 17 distinct stimulus pairs.)

In addition to these stimulus pairs, subjects were given single-stimulus descriptions consisting of number-of-patients-only trials (with no information about familiarity with recent developments) and familiarity-only trials (with no information about number of patients seen). Ten such single-stimulus trials were included, representing each level of each factor.

Procedure

The subjects were 63 students from introductory psychology classes at The University of Iowa. Subjects were provided a cover story suggesting a negative relationship between stimulus factors. They were told that recent advancements in treating this kind of depression will be much more familiar to recent graduates than to long-time practitioners; conversely, long-time practitioners will have had more experience dealing with the problem than will the recent graduates. Thus, some clinicians will be well informed about recent developments in treatment but will not have had much actual clinical experience, while others will have had considerable clinical experience but will not be very familiar with the most recent developments.

Subjects were given a booklet containing two replications of the complete design (the 17 stimulus-pair trials and the 10 single-stimulus trials). A different random order of presentation of the 27 different descriptions was provided for each replication. Subjects were told that each description in the booklet represents a different hypothetical clinical psychologist. They were asked to rate each clinician in terms of how well qualified they thought that clinician was for treating lonely, depressed college students. They were told to use a scale of 1 to 20, where the more qualified they judged a clinician to be, the higher the number they should assign. A space for writing down the rating was provided below each description.

Subjects were allowed to work at their own pace and were told that there are no "correct" answers; they were told to use their own judgment based on the information presented about each clinician. The first replication was used to familiarize subjects with the rating scale and the range of stimuli to be rated. Only the data from the second replication were used in the analyses that follow.

Importance Ratings and Relationship Check

Following completion of their ratings, subjects were asked the following question: "In making your judgments of competency, which factor did you consider to be more important--'number of patients seen' or 'familiarity with recent developments'?" Responses to this question were used to classify subjects on the basis of their weighting of the two factors.

Finally, subjects were given the task of filling in values of missing information when only one factor was presented. Each level of Number of Patients Seen was presented and each level of Familiarity with Recent Developments was presented, in random order. Subjects were instructed to fill in the blanks by giving what they think would be the average value of the missing factor for the given level of the presented factor. For example, they were asked to estimate the average value of "number of patients seen" for clinicians whose "familiarity with recent developments" was much above average. These responses were used as a "validity check" for individual subjects by determining if the subject actually perceived a negative relationship between the two factors.

Results

For purposes of examining individual differences in the inferring of missing values, subjects were classified in terms of their responses on the validity check phase of the experiment and their designation of the most important factor in their judgments. Forty-two out of the 63 subjects apparently did perceive a negative relationship between the factors. That is, when asked to fill in values of missing information they tended to indicate below average values for one factor when the other factor was above average, and conversely. Of these subjects, 22 subjects indicated that Number of Patients Seen was the more important factor and 20 subjects indicated that Familiarity with Recent Developments was the more important factor. These two subgroups form the major source of comparison for testing the hypothesis of this study.

Results for these two subgroups are plotted in Figure 1. The upper panels plot the data for subjects who indicated Number of Patients Seen as the more important factor, and the bottom panels plot the data for subjects who indicated Familiarity with Recent Developments as the more important factor. The left-hand panels plot mean ratings for stimulus pairs (solid lines) and mean ratings for single-stimulus trials with Number of Patients Seen as the missing factor (dotted lines). The right-hand panels plot mean ratings for stimulus pairs (solid lines, based on the same data as in the left-hand panels, but with a different variable on the abscissa) and mean ratings for single-stimulus trials with

Familiarity with Recent Developments as the missing factor (dotted lines).

Insert Figure 1 about here

Inspection of Figure 1 reveals that subjects' self-reports of which factor was more important were related to how they weighted the factors in the judgment task. The magnitude of the effect of manipulating Number of Patients Seen corresponds to the degree of separation of the solid lines in the left-hand panels. The magnitude of the effect of manipulating Familiarity with Recent Developments corresponds to the degree of separation of the solid lines in the right-hand panels. The wider spread between the solid lines in the upper left-hand panel than in the lower left-hand panel shows that subjects who reported greater weight for Number of Patients Seen did in fact give greater weight to this factor than did subjects who reported greater weight for Familiarity with Recent Developments. The wider spread between the solid lines in the lower right-hand panel than in the upper right-hand panel similarly shows that subjects who reported greater weight for Familiarity with Recent Developments did in fact give greater weight to that factor than did subjects who reported greater weight for Number of Patients Seen.

Theoretical interest centers on comparison of the slopes of the solid and dotted lines in each panel. Evidence that subjects

use a perceived negative relationship between factors to infer missing values occurs when the effect of a given factor is reduced on single-stimulus trials compared to stimulus pairs. This is because the effect of a given factor is reduced or "neutralized" when subjects infer an opposite value for the other factor. This would lead to flatter slopes for the dotted lines depicting responses on single-stimulus trials than for the solid lines depicting responses to stimulus pairs. For all panels in Figure 1 it can be seen that the dotted lines tend to be flatter than, or parallel to, the solid lines. This is in direct contrast to results predicted by the traditional averaging model which does not take into account the possibility that subjects may be inferring missing values and assumes that a stimulus factor has its greatest effect when it is not combined with another factor.

The tendency for the dotted line to be flatter than the solid lines is particularly pronounced in the upper left-hand panel and lower right-hand panel. In these panels the dotted line was significantly ($p < .05$) flatter than the solid line in 5 out of the 12 comparisons between dotted and solid lines. Only 2 out of 12 comparable comparisons were significant in the other panels. Because the upper left-hand panel and lower right-hand panel represent those data where the most important source of information for a given subject is missing, these results support the hypothesis that the inference effect is greatest when the missing values are from the subjectively more important source of information.

Support for a model based on inferring missing values was also obtained for those subjects who showed a positive relationship on the validity check. When subjects use a perceived positive relationship between stimulus factors to infer the value of missing information, the effect of presenting a single extreme piece of information will be enhanced because the net effect will be like that of having presented two pieces of information of similar value. This prediction was confirmed, as the effect on these subjects of varying each factor was greater when that factor was varied in isolation than when it was varied in combination with the other factor. Such a result has typically been taken as support for the traditional averaging model of information integration. However, as we have seen, a model based on the inferring of missing values can account for both the pattern of results displayed by those subjects who perceived a negative relationship between stimulus factors and the pattern of results displayed by those subjects who perceived a positive relationship between stimulus factors.

There are some trends which can be observed across panels of Figure 1 and which were also true for subjects who perceived a positive relationship between factors. For each variable differences in mean rating between "average" and "above average" are greater than differences in mean rating between "above average" and "much above average." Likewise, for each variable differences in mean rating between "average" and "below average" are greater than differences in mean rating between "below average" and "much

below average." Thus the psychophysical function for each variable relating changes in levels of that variable to changes in response is S-shaped, with negatively accelerated values from "average" to "much above average" and negatively decelerated values from "average" to "much below average."

Another common finding in all panels is that the dotted line falls between the solid lines for "average" and "below average." This shows that our subjects tended to give lower ratings when one source of information was missing, suggesting that the fact that information was missing was perceived somewhat negatively.

Discussion

This study confirms earlier findings that when people are faced with a judgment or decision for which not all of the key information is available, they may infer the level or value of the missing information (Huber & McCann, 1982; Johnson, 1984; Levin et al., 1984; Yamagishi & Hill, 1981). In the present case a scenario was established for perceiving a negative relationship between factors. Evidence for the inferring of missing values was present for those subjects who in fact perceived there to be a negative relationship between Number of Patients Seen and Familiarity with Recent Developments, and also for those subjects who perceived there to be a positive relationship.

Subjects who perceived a negative relationship tended to use inferred values such that a favorable level of the presented factor was neutralized by an assumed unfavorable level of the missing factor,

and conversely. This was especially true when the missing information was from the dimension the individual subject reported to be the more important dimension. Confirming the original hypothesis of this study, those subjects who judged experience (Number of Patients Seen) to be the more important factor were apt to infer that low levels of Familiarity with Recent Developments imply high levels of experience (upper left-hand panel of Figure 1), and those subjects who judged familiarity to be the more important factor were apt to infer that high levels of experience imply low levels of familiarity (lower right-hand panel).

An additional finding of interest was that whether or not subjects appeared to be using a negative relationship between experience and familiarity with recent developments to infer missing values, there was a general tendency to give lower ratings to descriptions that contained incomplete information. This general tendency appears to be common in studies of information integration (Anderson, 1983; Johnson, 1984; Leon, 1980; Levin, Ims, Simpson, & Kim, 1977) and appears to be independent of the use of inferences based on stored knowledge of interdimensional relationships.

In summary, there appear to be two distinct types of inference processes that occur when people are forced to make judgments in situations with less information than might normally be expected. The first is that subjects tend to give lower evaluations when information is missing, possibly because a favorable evaluation is

more "risky" when it is based on incomplete information.[1] The second is that subjects tend to use the perceived relationship between dimensions of information to infer the values of missing information, particularly when the missing information is from a dimension judged to be especially important. These tendencies may be prevalent in judgments where a crucial source of information is unavailable but where the judge may rely on prior experience with such judgments to infer missing values. It is becoming increasingly clear that models of information integration need to incorporate information processing strategies such as discussed here in order to capture the complexity of human judgment and decision making.

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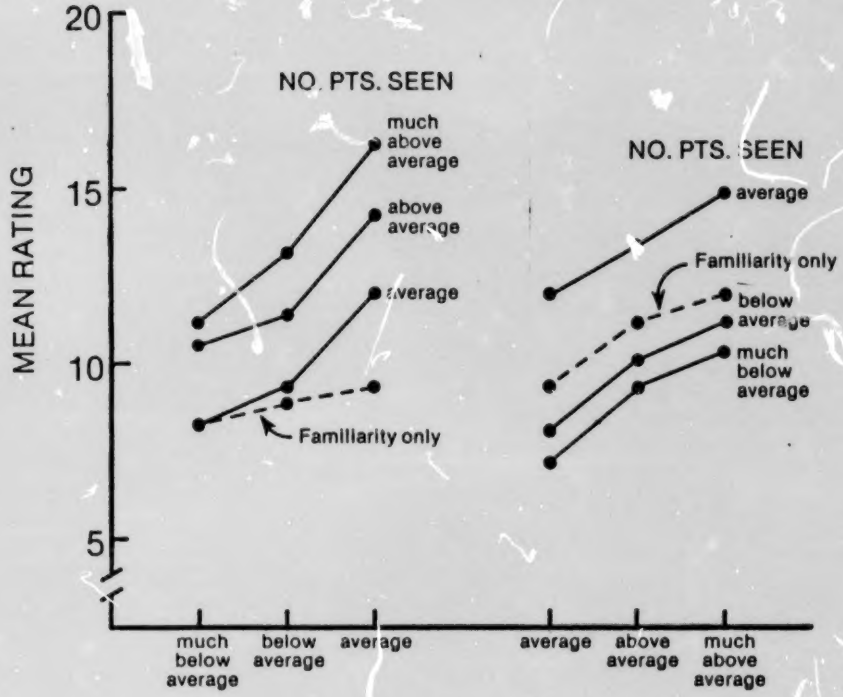
Footnote

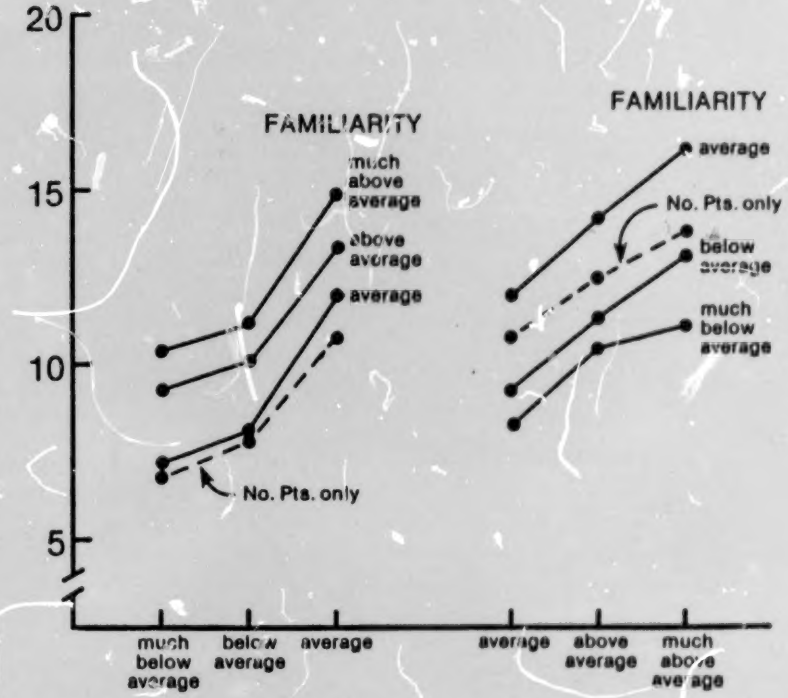
[1] A possible exception being investigated in our laboratory involves the withholding of "negative" information. While missing information about the "probability of winning" in a gambling task leads to a lowered likelihood of taking the gamble, missing information about the "probability of losing" has the opposite effect.

Figure Caption

Figure 1. Mean ratings as a function of Number of Patients Seen ("No. Pts. Seen") and Familiarity with Recent Developments ("Familiarity"). Subjects were classified in terms of which factor they rated as more important. Only data for subjects who perceived a negative relationship between factors are included.

SUBJECTS WHO RATED "NO. PTS. SEEN" AS MORE IMPORTANT





SUBJECTS WHO RATED "FAMILIARITY" AS MORE IMPORTANT